COMMISSION OF THE EUROPEAN COMMUNITIES

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M E M O R A N D U M

Request for financial aid under item 2 c of Article 55
of the E.C.S.C. Treaty for continuation
of research into "Fires and Underground Combustion in Mines"

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Request for financial aid under item 2 c of Article 55 of the E.C.S.C. Treaty for continuation of research into "Fires and Underground Combustion in Mines".

01 Applicants

(1) The Centre d'Etudes et Recherches des Charbonnages de France (Cerchar), Paris

(2) The Versuchsgrubengesellschaft mbH, Dortmund.

02 Introduction

Underground fires and spontaneous combustion are a source of danger to all persons working in mines and those which occasion no loss of life or injury may necessitate the sealing off of areas of mines with consequent loss of equipment and coal reserves.

Underground open fires, which may be fed by materials in the mine and enhanced by mine ventilation, can be started in many ways including mechanical friction, electrical faults, the use of explosives and the full development of spontaneous combustion.

Spontaneous combustion occurs in certain seams of coal when conditions are favorable for its development, these conditions being either natural ones or man made during the course of working.

A considerable amount of research over the years has resulted in a greater knowledge of fire prevention and control and the prevention, detection and control of spontaneous heatings. However, continued

research is necessary to meet the new problems posed by technical developments in mining and to further the state of knowledge on fires and spontaneous combustion in mines.

03 Current research

Both applicants are currently doing research for which financial aid has been granted by the Commission of the European Communities.

The Centre d'Etudes et Recherche des Charbonnages de France is conducting research into specific aspects of spontaneous combustion, the three years programme being scheduled for completion by 30th September 1974.

The Versuchsgrubengesellschaft mbH is conducting research into roadway fires, the programme of three years duration being scheduled initially for completion by 30th June 1974. An extension has been agreed and the programme will now finish by 31st March 1975.

In addition to the research by these two institutes aid was granted by the Commission in June 1974 to the National Coal Board for a three year programme of research into the detection and prevention of spontaneous combustion and the treatment of timber to prevent the spread of flame. This research envisages the development of instruments for monitoring of oxidation products, a continuous monitor for carbon monoxide and a hand held carbon monoxide meter. The former would enable comparisons between upcast & downcast shaft concentrations of carbon monoxide to be made and the latter would be used for locating the specific point of a heating. The spread of flame along the surface of timber used underground may be inhibited either by pre-treatment before transport underground or treatment after installation underground. The N.C.B. research will be concerned with both methods of treatment.

04 Research by the Centre d'Etudes et Recherche des Charbonnages de France

The proposed new research is a continuation of the current research under the same general headings and the following summarises under these headings the results achieved and future proposals.

(1) Forecasting the likelihood of spontaneous combustion in mines.

Investigation of cases of spontaneous combustion occuring during the past ten years plus laboratory research has highlighted the catalytic effect of pyrites. It is proposed that research be undertaken into the distribution of pyrites in coal seams, with a view to formulating a policy for the location of danger areas, and also into the part played in spontaneous combustion by pyrites contained in shales used for controlling or preventing heatings.

Laboratory work has been done to examine the importance of heat transference by evaporation and adsorption. It is proposed to establish whether or not water infusion causes echanges which assist or retard spontaneous combustion and if the former to ascertain possible preventive measures.

(2) Early detection of spontaneous combustion by gas analyses.

Laboratory tests on heated coal have indicated that the concentrations of gases evolved depend upon the test conditions. It is proposed that the influence of different variables such as granulometry, air flow and rate of heating be studied. It is also proposed to measure temperatures and gas contents in the goafs of likely seams.

(3) Conditions conducive to spontaneous combustion.

A large number of laboratory tests using an adiabatic micro calorimeter has enabled particular conditions likely to indicate spontaneous combustion in a 10 gm. sample to be determined. These conditions relate to the presence of a strong concentration of pyrites, damp air passing over damp coal and water adsorption by dry coal exposed to damp air.

Further information, unobtainable from such calorimeter tests in the laboratory, may be gained from research into spontaneous combustion in surface coal stocks and such research is proposed.

(4) Inhibiting oxidation.

It has not been possible to devote much time to this but study of relevant literature and a number of tests with the adiabatic micro calorimeter have been made. From the latter it has been established that, under ideal conditions at temperatures below 90°C., the inhibitive nature of products added to coal can be determined.

Using this method it is proposed to make a comparison of the inhibitive properties of various substances.

(5) Detection of spontaneous combustion by temperature measurement.

Devices for measuring temperatures have been designed and it is proposed that these be tested underground.

The equipment tested for measuring surface temperature has proved unsatisfactory. It is still felt that measurement of surface temperature may be useful in the detection of spontaneous combustion. From available literature it appears that some American equipment may be suitable and if this equipment can be obtained it is proposed that underground tests be made with it.

(6) Control of spontaneous combustion by pressure balancing.

Balancing of ventilation pressures may in certain cases reduce leakage into an area and may be used for preventative or control purposes. In certain configurations it may not be possible to achieve satisfactory balancing and other problems associated with methane and the risk of secondary fires may arise.

It is proposed to try to determine the extent to which pressure balancing may be practised and to study procedures for its application according to varying mine configurations.